H-Class™

GPIO Option ▪ ▪ ▪

right by our customers. ▪ ▪ ▪

datamax·o'neil

Overview

This document describes the installation and use of the General Purpose Input Output (GPIO) option for the H-Class printer. After verifying the kit contents and tools needed, follow the steps to install and begin using the option.
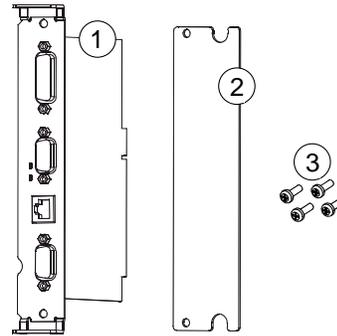
⚠ **CAUTION**	*For safety and to avoid equipment damage, turn OFF the power switch and unplug the AC power cord from the printer before starting this installation.*

Contents

This kit contains the following items:

① GPIO Circuit Card Assembly
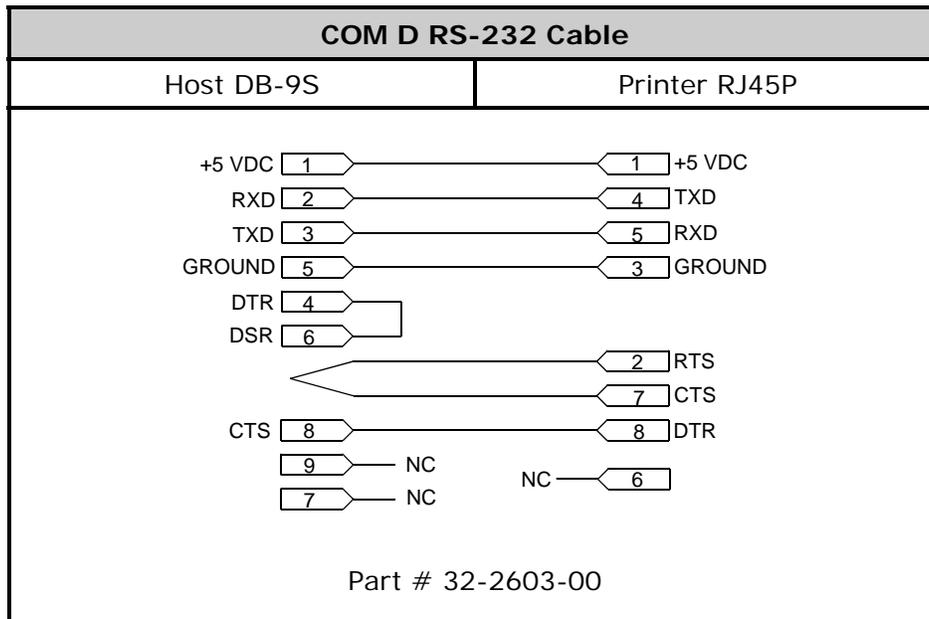
② Cover Plate

③ Screws

Tools Required

To install this option, you will need a Philips screwdriver.

Additional Requirements

Depending on your application, you may need the following hardware to interface the card:

- *GPI/O A* – DB15 Male connector (e.g., StarTech C15PCM) and shielded cabling.

- *GPI/O B* – High Density DB15 Male VGA connector (e.g., StarTech C15HPSM) and shielded cabling.

- *COM C* – DB9 Male connector (e.g., StarTech C9PSM) and shielded cabling, or a prefabricated cable (see part numbers and pin out requirements below).

- *COM D* – RJ45 Plug (e.g., Belkin R6G088) and shielded cabling, or a prefabricated cable (see part number and pin out requirements below).

COM C RS-232 Cables

Host DB-9S	Printer DB-9P	Host DB-25S	Printer DB-9P
TX 3 ———————→	2 RX	TX 2 ———————→	2 RX
RX 2 ←———————	3 TX	RX 3 ←———————	3 TX
	• 7 RTS		• 7 RTS
CTS 8 ←———————	• 4 DTR	CTS 5 ←———————	• 4 DTR
DSR 6 •	• 8 CTS	DSR 6 •	• 8 CTS
GND 5 •	• 5 GND	GND 7 •	• 5 GND
DTR 4 •		DTR 20 •	
Shield •———————•	Shield	Shield •———————•	Shield
Part # 32-2300-01		**Part # 32-2301-01**	

COM D RS-232 Cable

| Host DB-9S	Printer RJ45P
+5 VDC 1 ————————	1 +5 VDC
RXD 2 ————————	4 TXD
TXD 3 ————————	5 RXD
GROUND 5 ————————	3 GROUND
DTR 4	
DSR 6	
	2 RTS
	7 CTS
CTS 8 ————————	8 DTR
9 — NC	NC — 6
7 — NC	

Part # 32-2603-00
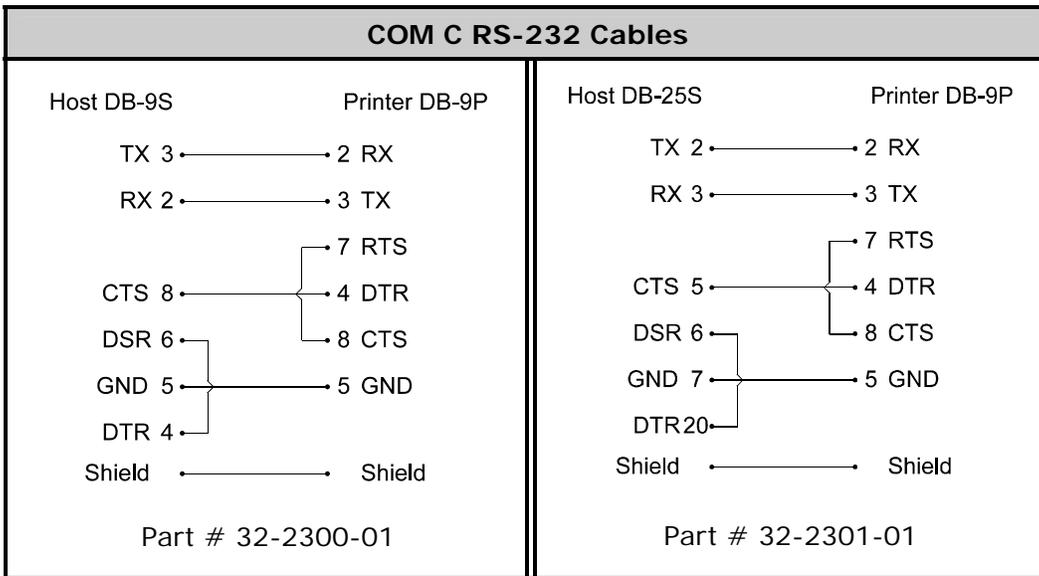
Configure the card to meet your interfacing requirements by arranging hardware jumpers, as described in the following procedure:

> ⚠️ **CAUTION**   *Always wear a wrist strap and follow standard ESD prevention measures when handling the card.*

A) Remove the card from the packaging and then place the card onto a static-free work area.

B) Set the jumpers on the card (detailed below) to meet the requirements of your application:
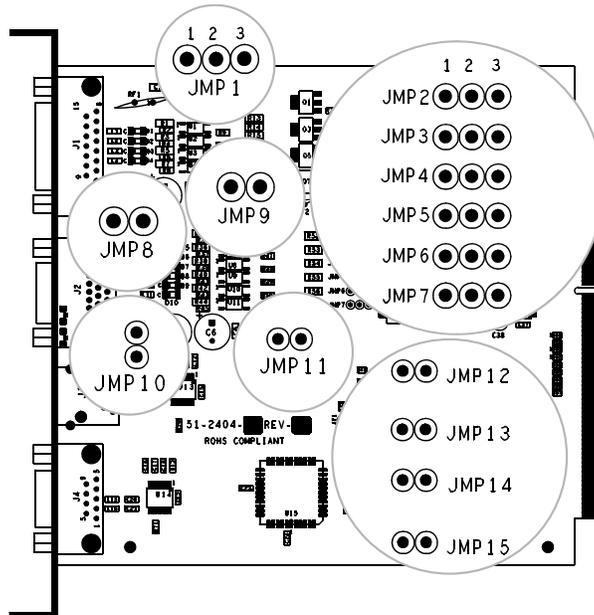
▶ **GPI/O A (J1)**

Four dedicated inputs control printer functions. Designed to interface to open-collector outputs, these inputs require no external pull-ups, while blocking diodes allow the use of totem pole outputs from +4.5 VDC to + 26 VDC. Optical isolators provide galvanic isolation. Two print control interface circuit examples are given below.
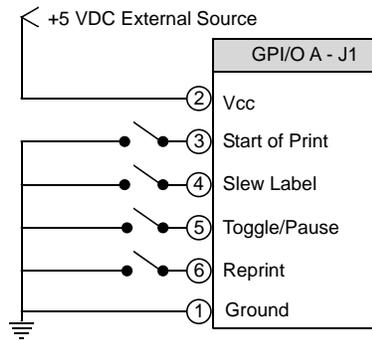
For direct inputs –

Use the printer's +5VDC and Ground to supply the devices interfacing to the GPI/O A inputs (as shown in the sample circuit, right).

GPI/O A - J1	
③	Start of Print
④	Slew Label
⑤	Toggle/Pause
⑥	Reprint
①	Ground
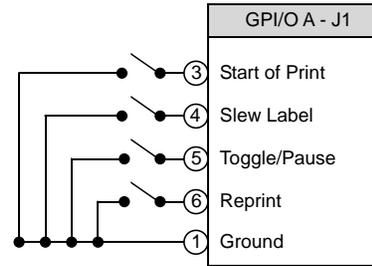
For isolated inputs –

To provide galvanic isolation for the GPI/O A inputs, remove Jumper JMP 9 then supply an external +5VDC source voltage to Pin 2, and remove Jumper JMP 8 then supply an external Ground to Pin 1 (as shown this sample circuit, right).

+5 VDC External Source

GPI/O A - J1	
②	Vcc
③	Start of Print
④	Slew Label
⑤	Toggle/Pause
⑥	Reprint
①	Ground

Seven dedicated outputs are available for control, warning, and error functions. These open-collector outputs have slew-limited signal-edge rise and fall times to prevent cross talk in the cabling. Optional 10K ohm pull-up resistors, tied to a common point for use at either +5 or +24 VDC, are available via Jumper JMP 1.

☑ **Note:** *If external pull-ups are used (that is, without Jumper JMP1 installed), ensure that the applied external voltage does not exceed +30VDC.*

The table below details the GPI/O A pin assignments, settings and functions.

Failure to properly configure the GPIO Port can result in damage to the printer and / or connected devices.

GPI/O Port A Jumper Overview					
Pin	Signal Name	Direction [1]	Jumper	Position	Function / Description
1	Ground	N/A	JMP 8	Installed	Printer chassis is used.
				Removed	Ground must be supplied.
2	+5 VDC		JMP 9	Installed	Printer +5VDC is used (.5 amp maximum)
					☑ *Note: Drawing more than .5 amps can cause unreliable printer operation.*
				Removed	+5VDC must be supplied.
3	Start Of Print [2]	Input	N/A	N/A	Programmable [3]
4	Slew Label				Media is advanced until the signal goes HIGH and, if not in continuous mode, the label is positioned at the next available TOF.
5	Toggle / Pause				The printer pauses when the signal is taken LOW.
6	Reprint				The last label is reprinted exactly, with no increment or time stamp changes; recommended for use during error conditions. Keeping this signal LOW produces non-stop printing.
7	+24 VDC	N/A			Printer +24 VDC (1.5 amp maximum).
8	Ground				Printer chassis.
9	Ribbon Low	Output	JMP 1	When inactive, outputs will be pulled up to a voltage determined by this jumper setting, where: ▪ Pins 1 – 2 = +5VDC; ▪ Pins 2 – 3 = +24VDC; or, ▪ None = an external voltage (not to exceed +30VDC) via external pull-ups providing a 20K ohm feedback path through any two outputs.	Programmable [1]. Signifies a RIBBON LOW DIAMETER warning condition.
10	Service Required				Evoked by occurrences listed under 'Fault Messages.'[1] Active LOW.
11	End Of Print				Programmable [1]. Signifies the End of Print (EOP) process.
12	Media Out				Evoked during an Out of Stock condition. Active LOW.
13	Ribbon Out				Evoked during an Out of Ribbon condition. Active LOW.
14	Data Ready				Evoked when a label is waiting to print. After Start of Print is received, printing will begin. For synchronization with the print cycle, End Of Print indicates the completion of the process. Active LOW.
15	Option Fault				Evoked during a Linear Scanner or RFID fault condition. Active LOW.

[1] Signal directions given relative to the printer.

[2] If active with no current print job, "WAITING FOR DATA" will be displayed. Specifying a quantity of 9999 while keeping this signal ON will cause non-stop label printing, except in single label "Imaging Mode", which will cause the printer to stop between labels. See the *Operator's Manual* for details.

[3] For details see *PRINTER OPTIONS / GPIO PORT* in the *Operator's Manual*.

► **GPI/O B (J2)**

Six unassigned inputs are designed to interface to open-collector outputs. These inputs require no external pull-ups, while blocking diodes allow the use of totem pole outputs from +4.5 VDC to + 26 VDC. Optical isolators provide galvanic isolation. Two print control interface circuit examples are given below.

For direct inputs:

Use the printer's +5VDC to supply the devices interfacing to the GPI/O B inputs (as shown in the sample circuit, right).

GPI/O B - J2

⑬ Input 1
⑧ Input 2
③ Input 3
⑫ Input 4
⑦ Input 5
② Input 6
⑥ Ground

For isolated inputs:

To provide galvanic isolation for the GPI/O B inputs, remove Jumper JMP 11 then supply an external +5VDC source voltage to Pin 1, and remove Jumper JMP 10 then supply an external Ground to Pin 6 (as shown in the sample circuit, right).

+5 VDC External Source

GPI/O B - J2

① Vcc
⑬ Input 1
⑧ Input 2
③ Input 3
⑫ Input 4
⑦ Input 5
② Input 6
⑥ Ground
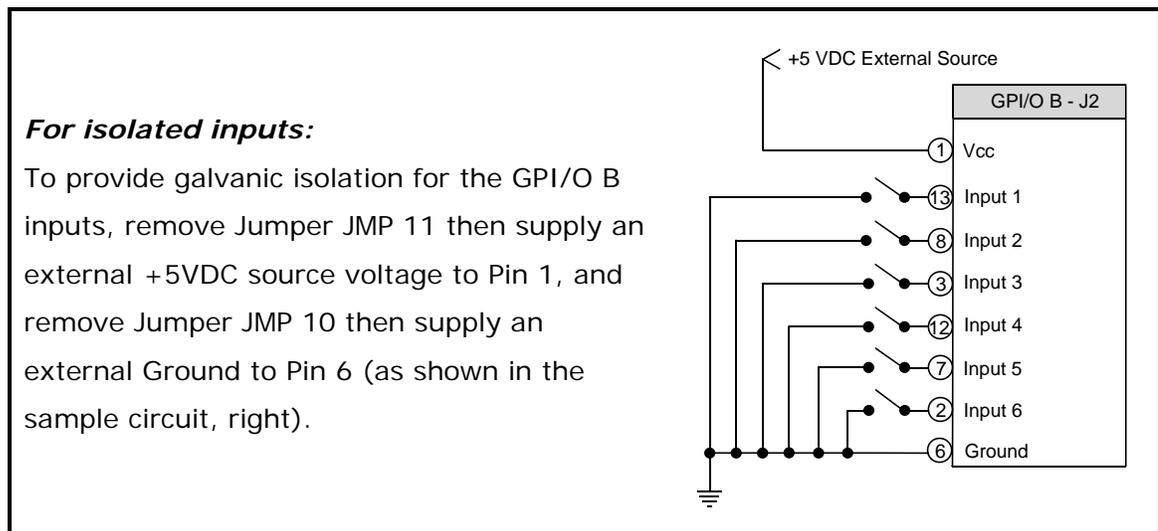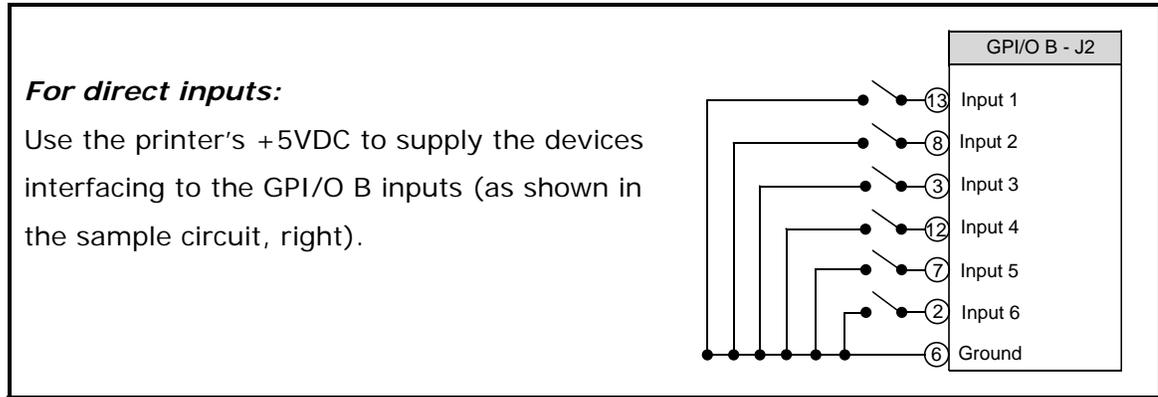
Six unassigned outputs have slew-limited signal-edge rise and fall times to prevent cross talk in the cabling. Optional 10K ohm pull-up resistors, one for each of the output lines, can be used at either +5 or +24 VDC via Jumpers JMP 2 – 7.

☑ **Note:** *If external pull-ups are employed (that is, when Jumpers JMP 2 - 7 are not installed), ensure that the applied external voltage does not exceed +30VDC.*

The table below details the GPI/O B pin assignments, settings and functions.

GPI/O Port B Overview				
Pin	Signal Name / Direction [1]	Jumper	Position	Function / Description
1	+5 VDC	JMP 11	Installed	Printer +5VDC is used (.5 amp maximum).
				☑ *Note: Drawing more than .5 amps can cause unreliable printer operation.*
			Removed	+5VDC must be supplied.
2	Input 6	N/A	N/A	Programmed input function.
3	Input 3	N/A	N/A	Programmed input function.
4	Output 6	JMP 7	Installed: Pins 1 – 2	Programmed output function pulled-up to +5VDC.
			Installed: Pins 2 – 3	Programmed output function pulled-up to +24VDC.
			Removed	An external voltage via external pull-ups will determine this level, not exceed +30VDC.
5	Output 3	JMP 4	Installed: Pins 1 – 2	Programmed output function pulled-up to +5VDC.
			Installed: Pins 2 – 3	Programmed output function pulled-up to +24VDC.
			Removed	An external voltage via external pull-ups will determine this level, not exceed +30VDC.
6	Ground	JMP 10	Installed	Printer chassis is used.
			Removed	Ground must be supplied.
7	Input 5	N/A	N/A	Programmed input function.
8	Input 2	N/A	N/A	Programmed input function.
9	Output 5	JMP 6	Installed: Pins 1 – 2	Programmed output function pulled-up to +5VDC.
			Installed: Pins 2 – 3	Programmed output function pulled-up to +24VDC.
			Removed	An external voltage via external pull-ups will determine this level, not exceed +30VDC.
10	Output 2	JMP 3	Installed: Pins 1 – 2	Programmed output function pulled-up to +5VDC.
			Installed: Pins 2 – 3	Programmed output function pulled-up to +24VDC.
			Removed	An external voltage via external pull-ups will determine this level, not exceed +30VDC.
11	+24 VDC	N/A	N/A	Printer +24 VDC (1.5 amp maximum).
12	Input 4	N/A	N/A	Programmed input function.
13	Input 1	N/A	N/A	Programmed input function.
14	Output 4	JMP 5	Installed: Pins 1 – 2	Programmed output function pulled-up to +5VDC.
			Installed: Pins 2 – 3	Programmed output function pulled-up to +24VDC.
			Removed	An external voltage via external pull-ups will determine this level, not exceed +30VDC.
15	Output 1	JMP 2	Installed: Pins 1 – 2	Programmed output function pulled-up to +5VDC.
			Installed: Pins 2 – 3	Programmed output function pulled-up to +24VDC.
			Removed	An external voltage via external pull-ups will determine this level, not exceed +30VDC.

[1] Signal directions given relative to the printer.

► **COM C (J4)**

Recognized by the printer as Serial Port C, COM C functions as an auxiliary RS-232 interface or dedicated device port for the RFID and Linear Scanner options. Pin assignments for the port are as follows:

Pin Number	COM C (J4)
1	+5V (@ .5 amps)
2	RX
3	TX
4	DTR
5	Ground
6	Ground
7	RTS
8	CTS
9	N/C

At default settings, the COM C port automatically selects its function. To force a selection, however, change the jumper settings as denoted in the table below:

COM C Jumper Setting Functions				
Selected Function	Jumper and Setting			
	JMP 12	JMP 13	JMP 14	JMP 15
RS-232 Communications (default)	On	On	On	On
RFID	Off	On	On	On
Linear Scanner	On	Off	On	On

☑ *Note:* *Jumper settings override menu settings: If set for RS-232 (default) with the RFID and Linear Scanner menu-enabled, the printer will assign RFID to Serial Port B (back plane port J13) and the Linear Scanner to the COM C port.*

► **COM D (J3)**

Recognized by the printer as Serial Port D, COM D is an auxiliary RS-232 interface. Pin assignments for the port are as follows:

Pin Number	COM D (J3)
1	+5V (@ .5 amps)
2	RTS
3	Ground
4	TX
5	RX
6	Ground
7	CTS
8	DTR

Step 2: Installing the Option

Install the GPIO Card as described below:

A) Turn OFF the **Power Switch** and unplug the power cord from the **AC Receptacle**.

Power Switch

AC Receptacle
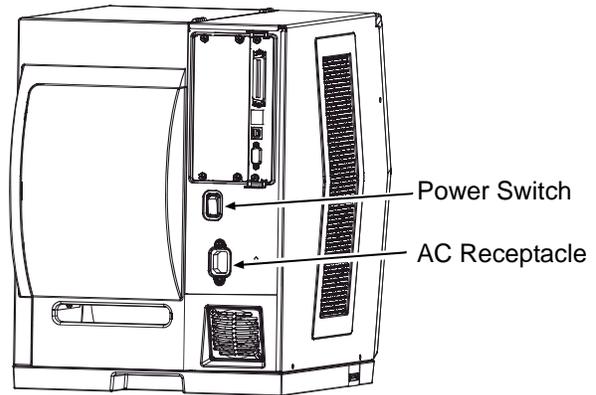
B) Remove the two **Screws** that secure the **Back Panel** to the **Card Cage**, and then remove the **Back Panel**.

Screws

Card Cage

Back Panel
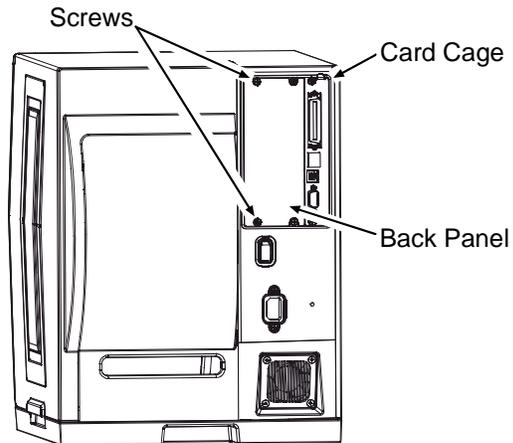
C) Slide the **GPIO Card** (Item 1), **Notch** down, into the leftmost **Card Cage Slot**. Firmly push the **GPIO Card** to seat it and then secure the card using the two **Screws** (Item 3).

Card Cage Slot

GPIO Card

Screws

Notch

Card Cage
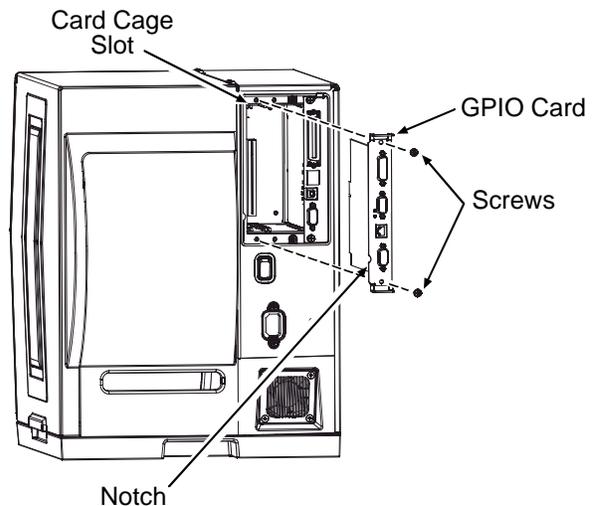
Cover Plate

Screws

D) Place the **Cover Plate** (Item 2) onto the **Card Cage**, as shown, then install and tighten the two **Screws** (Item 3) to secure the plate.
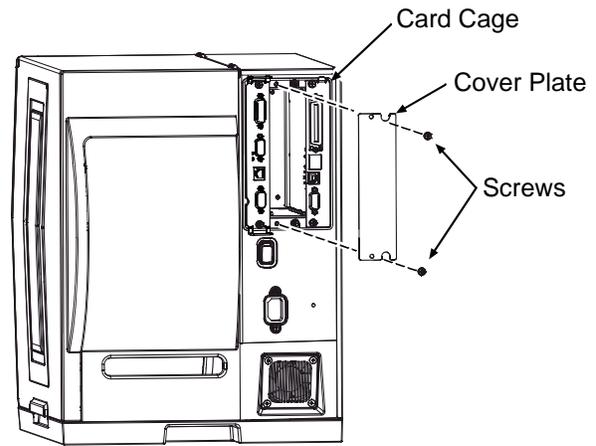
Step 3: Interfacing

Interface the card according to your application requirements (see the drawing below for connector pin-outs, refer to Step 1 for signal details) as follows:
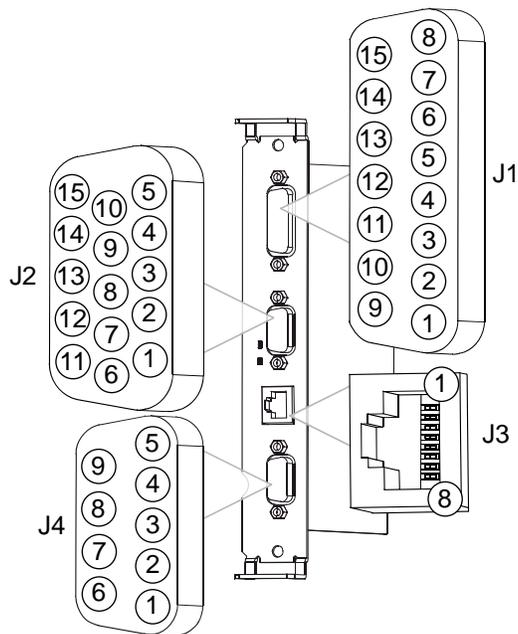
A) For GPIO functions connect a GPI/O interface cable to the GPI/O A (J1) and / or GPI/O B (J2) ports.

B) For RS232 communications connect a serial interface cable to COM C (J4) and / or COM D (J3); for dedicated devices, connect the cabling from that device to COM C (J4).

> ☑ **Note:**   *If using both the RFID and Linear Scanner, see Configuring Hardware Settings, above.*

C) Connect the AC power cord to the printer and then turn the power switch ON.

Step 4: Configuring the Software Settings

Configure the printer's menu settings for the option's operation.

A) Using the Control Panel, enter the **ADVANCED MENU** (see the *Operator's Manual* for menu navigation details):

- If using the GPIO A (J1) port, configure the settings to meet the requirements of your system using the **PRINTER OPTIONS → GPIO PORT → APPLICATOR** menu selection;

- If using the GPIO B (J2) port, refer to your MCL documentation;

- If using the COM C (J4) port for serial communications, configure the it to meet the requirements of your host system's serial port settings using the **COMMUNICATIONS → SERIAL PORT C** menu selection; or,

  If using the COM C (J4) port for a dedicated device, enable that device using the **PRINTER OPTIONS** menu selection; and,

- If using the COM D (J3) port for serial communications, configure the port to meet the requirements of your host system's serial port settings using the **COMMUNICATIONS → SERIAL PORT D** menu selection.

B) After entering the desired settings exit the menu system and save your changes. *The printer is now ready to operate using the GPIO option.*

Verifying Setup and Operation

Verification of the settings and active monitoring is provided:

- **Indicators –** View incoming (IN) and outgoing (OUT) signal activity via the card bracket. Sampled every millisecond, these LED indicators change color as incoming or outgoing GPIO signals change state.

Signal In

Signal Out

- **Input Monitor** – Display incoming GPIO binary signal states using the **ADVANCED MENU → DIAGNOSTICS → OPTIONS TESTING → TEST GPIO → MONITOR GPIO INPUT** selection.

```
┌──────────┐        ┌────────────────────────────────────────────┐
│ GPIO A   │        │  SOP      FEED       PAUSE       REPRT      │
│ Signals  │═══════▶│   1         1          0           0        │
└──────────┘        │                                            │        ┌──────────┐
                    │  i1    i2    i3    i4    i5    i6           │◀═══════│ GPIO B   │
                    │   0     1     0     1     1     1           │        │ Signals  │
                    └────────────────────────────────────────────┘        └──────────┘
```

☑ ***Note:*** *Unused, non-connected inputs will have an indeterminate state, and may assume a value of 1 or 0.*

- **Output Monitor** – Display outgoing GPIO binary signal states using the **ADVANCED MENU → DIAGNOSTICS → OPTIONS TESTING → TEST GPIO → MONITOR GPIO OUTPUT** selection.

```
┌──────────┐        ┌────────────────────────────────────────────┐
│ GPIO A   │        │  EP    RL    SR    MO    RO    DR    OF     │
│ Signals  │═══════▶│   0     0     0     0     0     0     0      │
└──────────┘        │                                            │        ┌──────────┐
                    │  o1    o2    o3    o4    o5    o6           │◀═══════│ GPIO B   │
                    │   0     0     0     0     0     0           │        │ Signals  │
                    └────────────────────────────────────────────┘        └──────────┘
```

☑ ***Note:*** *Unused, non-connected outputs will have an indeterminate state, and may assume a value of 1 or 0.*

- **GPIO Report** – Print the configuration and current signal state information using the **ADVANCED MENU / DIAGNOSTICS / OPTIONS TESTING / TEST GPIO / PRINT SIGNAL INFO** selection:

```
┌─────────────────────────────────────────────────────────────────┐
│ GPIO SIGNAL INFO                                                  │
│ WED 11:04AM 4JUL2005                                              │
│ CARD ID#3                                                         │
│                                                                   │
│ OUTPUT SIGNALS                        INPUT SIGNALS               │
│                                                                   │
│ END OF PRINT      o1                  START OF PRINT    i1        │
│ PIN# 11 GPIO A    PIN# 15 GPIO B      PIN# 3 GPIO A     PIN# 13 GPIO B
│ LOW PULSE         CURRENT LEVEL 1     ACTIVE HIGH       CURRENT LEVEL 1
│ CURRENT LEVEL 1                       CURRENT LEVEL 1             │
│                                                        i2        │
│ RIBBON LOW        o2                  FEED             PIN# 8 GPIO B
│ PIN# 9 GPIO A     PIN# 10 GPIO B      PIN# 4 GPIO A    CURRENT LEVEL 0
│ ACTIVE LOW        CURRENT LEVEL 0     ACTIVE LOW                 │
│ CURRENT LEVEL 0                       CURRENT LEVEL 1   i3        │
│                                                        PIN# 3 GPIO B
│ SERVICE REQUIRED  o3                  TOGGLE PAUSE     CURRENT LEVEL 1
│ PIN# 10 GPIO A    PIN# 5 GPIO B       PIN# 5 GPIO A              │
│ ACTIVE LOW        CURRENT LEVEL 1     ACTIVE LOW       i4        │
│ CURRENT LEVEL 1                       CURRENT LEVEL 1  PIN# 12 GPIO B
│                                                        CURRENT LEVEL 1
│ MEDIA OUT         o4                  REPRINT                    │
│ PIN# 12 GPIO A    PIN# 14 GPIO B      PIN# 6 GPIO A    i5        │
│ ACTIVE LOW        CURRENT LEVEL 1     ACTIVE LOW       PIN# 7 GPIO B
│ CURRENT LEVEL 1                       CURRENT LEVEL 1  CURRENT LEVEL 1
│                                                                   │
│ RIBBON OUT        o5                                   i6        │
│ PIN# 13 GPIO A    PIN# 9 GPIO B                        PIN# 2 GPIO B
│ ACTIVE LOW        CURRENT LEVEL 1                      CURRENT LEVEL 1
│ CURRENT LEVEL 1                                                  │
│                                                                   │
│ DATA READY        o6                                             │
│ PIN# 14 GPIO A    PIN# 4 GPIO B                                  │
│ ACTIVE LOW        CURRENT LEVEL 1                                │
│ CURRENT LEVEL 1                                                  │
│                                                                   │
│ OPTION FAULT                                                     │
│ PIN# 15 GPIO A                                                   │
│ ACTIVE LOW                                                       │
│ CURRENT LEVEL 1                                                  │
└─────────────────────────────────────────────────────────────────┘
```